Missouri Department of Natural Resources

Revised Proposed 2016 Listing Methodology Document
Biological Assessment Workgroup Comments and Responses

April 30, 2014

Missouri Department of Natural Resources
Water Protection Program
PO Box 176
Jefferson City, MO 65102-0176
800-361-4827 / 573-751-1300

2016 Listing Methodology Summary of Comments Following February 26, 2014 Workgroup Meeting

Background: The 2016 Listing Methodology Document (LMD) was originally posted for public comment at the same time as the 2014 303(d) impaired waters list (October 15, 2013 – January 31, 2014). Due to comments and concerns from stakeholders regarding the proposed 2016 LMD, the Department postponed seeking Clean Water Commission approval during the April 2, 2014 meeting. This allowed the Department to schedule a meeting with the biological assessment workgroup to discuss comments and concerns. The biological assessment workgroup meeting was held on February 26, 2014.

The below comments are in response to the updated LMD following the February 2014 Biological Assessment Workgroup meeting. A revised version of the 2016 LMD was provided to the bioassessment workgroup members on April 14, 2014 for review. The Department requested comments to be provided by April 30, 2014.

All revisions made to the revised 2016 proposed LMD are noted as comments or through track changes within the document.

Biological Workgroup Members receiving the revised 2016 LMD:

Missouri Department of Natural Resources
Dave Michaelson
Randy Sarver
Lynn Milberg
John Hoke
Colleen Meredith
Joe Engeln
John Ford
Robert Voss
Kirk Lambrecht
Bill Whipps

Missouri Department of Conservation
Matt Combes
Mike McKee
Karen Bataille

U.S. Environmental Protection Agency
Catherine Wooster-Brown

Geosyntec Consultants, Inc.
Chris Zell
David Carani
Randy Crawford

Barr Engineering
Rob Morrison

City of Springfield
Jan Millington
Steve Meyers
Errin Kemper

St. Louis Metropolitan Sewer District
Nick Bauer

Missouri Department of Health and Senior Services
Jeff Wenzel

Ozark Water Watch, Org.
Dave Casaletto

Tyson Foods
Jason McCauley

Missouri Farm Bureau
Leslie Holloway

Missouri Public Utility Alliance
Phil Walsack

Newman, Comley & Ruth P.C.
Robert Brundage

Hemming, Durham & Richardson, Inc.
Trent Stober

2016 Listing Methodology Summary of Comments Following February 26, 2014 Workgroup Meeting

General Comments received on May 2, 2014

City of Springfield and Barr Engineering

Many commenters's appreciated the efforts of the Department to address the stakeholders' comments to the draft LMD. The revised draft sent to the workgroup members on April 14, 2014 provides much of the greater detail and specificity requested.

Specific Comments received on May 2, 2014

City of Springfield and Barr Engineering

Weight of Evidence Analysis

The Department provided additional information regarding the weight of evidence approach, but recommends the Department to collect additional data in many situations where the Department may rely on the weight of evidence analyses to make use of attainment decisions. For instance, in the case of sediment toxicity, the Department should rely on a multiple lines of evidence including biologic, chemistry, and toxicity data. Where multiple lines of evidence are not available in these instances, the Department should assign waters to Category 2b or 3b until additional data are available for an assessment decision. The city of Springfield suggested additional refinements to the text located on page 14 and page 15 of the LMD.

MDNR Response

Much wording has been added to Appendix E of the LMD to clarify the assessment approach to be taken. The Department has considered and/or incorporated much of the suggested wording. Additional discussions may be necessary with sediment toxicity experts prior to incorporating specific types of data for determination of toxicity. The Department would like to explore these suggestions further for potential incorporation into the 2018 LMD.

City of Springfield and Barr Engineering

Sediment Assessments

The Department relies upon the Probable Effects Concentrations (PEC) and Probable Effect Quotients (PEQs) to predict sediment toxicity as outlined by McDonald et al (2000). The initial draft of the 2016 LMD used a long standing threshold of 150% of PECs to trigger a weight of evidence analysis. If the average concentration exceeded 150% of the PEC threshold value, the water body was determined to have a narrative criteria aquatic life use impairment for the particular pollutant in question (metals). In the revised LMD the threshold was reduced to 100% for all sediment (metals) contaminants with the exception of arsenic. It was suggested the Department restore the 150%

threshold; otherwise, the rate of false positives for assuming sediments that exceed the PEC are toxic would be as high as 25%.

MDNR Response

The Department restored the 150% PEC threshold for sediment toxicity at this time, but will take the opportunity to explore this further for potential incorporation into the 2018 LMD. The assessment process followed for PEC was revised to assess following the geometric mean instead of the arithmetic mean. Overall, the geometric mean for a set of values is generally less than that of the arithmetic mean for the same set of values. For example, given the set of values: 0.596, 1.235, 0.939, 2.851, 0.345, 1.284, 0.794, 0.129. The average is 1.022, while the geomean is 0.739. Updating the calculation to the geomean resulted in a number of water bodies falling below the PEC threshold. Preliminary review of changing the PEC threshold from 150% to 100% did not indicate this would cause a significant increase in waters being returned to the 303(d) list of impaired waters. Overall, revising the 100% PEC threshold would provide consistency with McDonalds et al (2000) recommendations. Due to stakeholder concerns, the Department will conduct additional research and discussion regarding the potential differences between using the 150% to 100% PEC threshold.

City of Springfield

Biological Monitoring and Assessments

The Department should provide flexibility to use more quantitative habitat assessments in addition to the Department's Stream Habitat Assessments for evaluating habitat impairments.

MDNR Response

There is nothing precluding any interested party from conducting habitat assessment studies. Provided that the proposed habitat assessment study methods are reviewed by Department staff and judged to be well-documented and scientifically robust, the Department would consider the study as part of its weight of evidence analyses. The Department's habitat assessment protocols, however, are designed to take into account some of the factors that may contribute to impaired macroinvertebrate scores. Although not strictly quantitative, this method is based on methods designed by EPA (Barbour et al. 1999), and they are carried out consistently among reference streams and test streams to gauge differences.

Barbour, M.J., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid bioassessment protocols for use in streams and wadeable rivers: periphyton, benthic macroinvertebrates, and fish. Second edition. EPA 841-B-99-002. United States Environmental Protection Agency. Office of Water, Washington, D.C.

Sampling events with missing habitats should not be used for impairment decisions.

MDNR Response

After discussions with Department biologists, we have concluded that results of a biological assessment will not be discounted based solely upon missing habitats at this time. There are documented instances when stream segments have met full biological attainment in absence of a habitat type. The Department would like to maintain flexibility to allow for consultation with Department biologists to determine the extent to which habitat availability is responsible in the event of a non-supporting (< 16) Missouri Stream Condition Index (MSCI) score.

The Department should specify that candidate reference and study streams should be identified within, not only the same Ecological Drainage Unit, but also the same Aquatic Ecological System Types when possible.

MDNR Response

Based on work conducted by Sowa and others through the Missouri Resource Assessment Partnership (MoRAP), the Ecological Drainage Unit hierarchical level has an acceptable level of precision to account for differences in taxonomic composition. A publication explaining the makeup of several of the eight ecological classifications used in Missouri is cited below.

Sowa, S.P., G. Annis, M.E. Morey, and D.D. Diamond. 2007. A gap analysis and comprehensive conservation strategy for riverine ecosystems of Missouri. Ecological Monographs 77(3): 301-304.

Barr Engineering

2012 Department of Health and Senior Services (DHSS) memorandum

On page 23 of the draft LMD, footnote 21 of Table 1.2. has been revised to include reference to a "2012 DHSS memorandum (not yet approved)…" to identify revised threshold values for fish tissue and additional pollutants for consideration. These values and additional pollutants have not been finalized by the DHSS for use in their Fish Advisories; therefore, it does not seem appropriate for the Department to utilize a draft memorandum in the 2016 LMD. The memorandum should be incorporated into the LMD after the memorandum in question has been finalized.

MDNR Response

This footnote was included for informational purposes only. Additional wording has been added to reflect the potential for future revisions of the LMD based upon approval of the DHSS.

2016 Listing Methodology Summary of Comments Following February 26, 2014 Workgroup Meeting

Other Comments

Missouri Department of Conservation

In Table 1.1 on page 17, it was recommended to add clarification regarding Toxic Chemicals. Does an exceedence of water quality criteria constitute an "event" or does a documented fish kill have to occur even if water concentrations of a chemical exceed the water quality criteria for aquatic life?

MDNR Response

As stated in Table 1.1, if any of the conditions occur once in a three-year period it will cause a non-attainment listing.

Does the death of other aquatic organisms (e.g., crayfish or mussels) trigger an acute event?

MDNR Response

The Department tracks all reported aquatic life die-off events due to toxic events. The wording has been updated to reflect die-off of aquatic life such as fish, mussels, and crayfish.

Other Updates to the proposed 2016 LMD

Category 5 explanation (page 5) was reworded to provide additional clarity.

Additional wording was provided to pages 47-48. Terminology was updated and is now consistent with wording stated in the Code of State Regulations.

May 1, 2014

Ms. Trish Rielly
Water Protection Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102

Subject: Public Comments Regarding the Draft Methodology for the Development of the 2016 Section 303(d) List in Missouri Document

Ms. Rielly:

The City of Springfield sincerely appreciates the Missouri Department of Natural Resources' (MDNR) efforts to address stakeholders' comments related to the draft Methodology for the Development of the 2016 Section 303(d) List in Missouri (2016 LMD). The draft 2016 LMD sent to stakeholders on April 14, 2014 provides much of the greater detail and specificity requested by the City. We offer the following comments to further improve this critically important process for determining beneficial use attainment within Missouri's waters.

Additional refinements to the Weight of Evidence approach are suggested.

The City urged MDNR to provide greater detail into the types of environmental data that may be considered when assessing the Weight of Evidence within the City's January 31, 2014 comment letter. MDNR did provide additional detail to the appropriate sections of the 2016 LMD. We recommend collection of additional data in many situations where MDNR will rely on Weight of Evidence analyses to make use attainment decisions. Many times inadequate data are available to make these decisions, particularly for potential impacts to aquatic life. In the case of sediment toxicity, MDNR should rely on multiple lines of evidence including biologic, chemistry, and toxicity data. The proposed LMD includes Probable Effects Concentrations (PECs) from McDonald (2000) as the primary measures of sediment toxicity. However, the true aquatic life impacts from these constituents is complicated by the actual bioavailability of contaminants, which can vary significantly based upon site conditions. Where multiple lines of evidence are not available in these situations, MDNR should assign waters to Category 2B or 3B until additional data are available for an impairment decision. To address these concerns, we offer the following additional refinements (in bold) to the text on Page 14.

> *For narrative criteria, the numeric thresholds included in Table 1.2 have not been adopted into state Water Quality Standards. The Department will use a weight of evidence analysis for evaluating all narrative criteria. Under the weight of evidence approach, all available information is examined and the greatest weight is given to data that provide the best supporting evidence. In determining the*

Office of the Director
Busch Municipal Building • 840 Boonville Avenue
Springfield, Missouri 65802 • 417-864-1919 • springfieldmo.gov/recycling

CITY OF Springfield
ENVIRONMENTAL SERVICES

order of best supporting evidence, best professional judgment will be used to consider factors such as data quality and site-specific environmental conditions. For those analytes with numeric thresholds, the threshold values given in Table 1.2 will trigger a weight of evidence analysis to determine the existence or likelihood of a use impairment and the appropriateness of proposing a 303(d) listing based on narrative criteria. This weight of evidence analysis will include the use of other types of environmental data when it is available ***or collection of additional data to make a more informed use attainment decision****. Examples of other relevant environmental data might include* ***physical and chemical data to better understand potential toxicity (e.g., carbon-normalzed equilibrium sediment benchmarks (ESBs) for non-ionizable organic chemicals (NIOCs), porewater concentrations and simultaneously extracted metals/acid-volatile sulfide)****, biological data on fish or aquatic invertebrate animals or toxicity testing of water or sediments. See Appendix E for clarification on use of the weight of evidence approach.*

When the weight of evidence analysis suggests, but does not provide strong, scientifically defensible evidence of impairment ***supported by multiple lines of evidence****, the Department will place the water body in question in Categories 2B or 3B. The Department will produce a document showing all relevant data and the rationale for the use attainment decision. All such documents will be made available to the public at the time of the first public notice of the proposed 303(d) list. A final recommendation on the listing of a water body based on narrative criteria will only be made after full consideration of all comments on the proposal.*

We also suggest the following refinements MDNR's additions with respect to data management on Page 15.

For any given water, available data may occur throughout the system and/or be concentrated in certain areas. ***Data collected within a waterbody segment are aggregated unless discrete pollution sources impact specific locations.*** *When the location of pollution sources are known, the Department reserves the right to assess data representative of impacted conditions separately from data representative of unimpacted conditions. Pollution sources include those that may occur at discrete points along a water body, or those which are more diffuse.*

Sediment quality screening thresholds should be raised to former levels in the 2016 LMD.

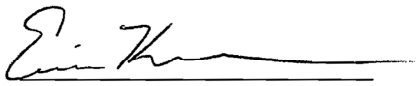
MDNR relies upon PECs and Probable Effect Quotients (PEQs) to predict sediment toxicity as outlined by McDonald et al. (2000). The initial draft 2016 LMD used MDNR's long standing threshold of 150% of PECs to trigger a Weight of Evidence analysis. However, MDNR reduced this threshold to 100% for all sediment contaminants with the exception of arsenic. We suggest that MDNR restore the 150% threshold given the screening nature intended for PECs. PECs are defined so that sediments with concentrations exceeding the PEC show some toxicity 75% of the time (MacDonald et al., 2000). By definition, therefore, the rate of false positives for assuming sediments that exceed the PEC are toxic would be as high as 25% (i.e., "false positive" means that a non-toxic sediment is identified as toxic). A high rate of false positives may be appropriate when PECs are used as a screening procedure as part of a tiered approach that identifies sediments for

which more in-depth and accurate methodologies are considered. However, using PECs directly as the basis for 303(d) listing suggests that as many as 25% of the site listed as impaired may be listed incorrectly. MDNR primarily uses 10% significance levels for impairment decisions. Therefore, the use of PEC values directly as a definition of impairment would produce a higher incidence of Type I errors than likely intended.

Further modifications to evaluation of biologic data are suggested.

Based upon stakeholders' comments, MDNR developed a new and detailed section describing biologic evaluation methods. These details provide much greater transparency and reproducibility of biologic use attainment decisions. We suggest that MDNR provide flexibility to use more quantitative habitat assessments in addition to MDNR's Stream Habitat Assessments for evaluating habitat impairments. In addition, sampling events with missing habitats should not be used for impairment decisions. With respect to small stream assessments, we recommend always collecting contemporaneous study and control or candidate reference stream data to rule out potential climatic impacts to biologic scores. We also recommend that streams of similar size should always be directly compared regardless of the comparability of control or candidate reference stream data to wadeable/perennial reference streams. Lastly, MDNR's inclusion of a process to select small candidate reference streams is very helpful and a significant improvement. We suggest refining the draft process to specify that candidate reference and study streams should be identified within, not only the same Ecological Drainage Unit, but also the same Aquatic Ecological System Types when possible.

The City greatly appreciates this opportunity to provide public comment and your thoughtful consideration of these comments. Please feel free to contact me at anytime to discuss any of these issues.
Sincerely,



Errin Kemper, P.E., D.WRE
Assistant Director of Environmental Services
Springfield, MO 65802

CC: Trent Stober
Steve Meyer
Jan Millington
Paul Calamita

Rielly, Trish

From: Rob K. Morrison <RMorrison@barr.com>
Sent: Friday, May 02, 2014 4:20 PM
To: Rielly, Trish
Subject: RE: Revised 2016 LMD

Trish, thanks for the effort to coordinate and sending out the revisions. I intended to send these to you earlier, but I got busy and didn't make it. I'll offer these for your consideration.

1. On pages 15, 32, and 35 of the draft 2016 Listing Methodology Document (LMD), the procedure used to assess whether pollutant levels in sediments are of sufficient concentration to render a narrative criteria impairment of the aquatic life use of the waterbody are propsed for revision. The Department is proposing to alter the procedure used in previous LMDs by changing the statistical analysis method of the sediment chemistry samples from an arithmetic average concentration to geomean concentration and to lower the threshold Probable Effects Concentration (PEC) value from 150% to 100%. Utilizing the geomean of a given data set is the appropriate tool to evaluate the pollutant concentrations and the2016 LMD should be revised accordingly. In previous LMD's, the average concentration of pollutants in sediments for stream segments were compared to 150% of the PECs that were developed in 2000 by DD MacDonald et al. If the average concentration exceeded 150% of the PEC threshold value, the waterbody was determined to have a narrative criteria aquatic life use impairment for the particular pollutant in question. The 150% threshold was developed to protect against false positive impairments since there has been some question historically with the universal applicability of the PECs developed by MacDonald et.al. Since the department has not vetted these threshold criteria values via promulgation into regulation, these values should not carry the same weight as promulgated numeric criteria, in terms of impairment decisions. Without the usage of a threshold value, direct usage of the PEC value could result in false positive impairments. This approach of guarding against false positive impairment decisions continues to be embodied within the proposed 2016 LMD through the application of the PEC Quotient (PECQ). The 2016 draft LMD indicates that an impairment occurs when the PECQ is 0.75. Appendix D of the 2016 LMD further clarifies that according to the MacDonald research, 85% of sediment samples with a PECQ of greater than 0.5 were toxic, therefore, the Department chose 0.75 as the PECQ threshold for impairment determinations. This appears to be a clear usage of the weight of evidence approach for narrative criteria and a recognition that the PECQ has not been promulgated into the State of Missouri's water quality standards and does not enjoy the same weight as duly promulgated water quality criteria. The Department should revise the LMD to and utilize the geomean in the analysis of sediment chemistry samples for stream segments and retain the 150% PEC or develop a revised threshold that more appropriately correlates with the usage of a geometric mean in the analysis of the sediment chemistry data.
2. On page 23 of the draft LMD, footnote 21 of Table 1.2 has been revised to include a reference to a "2012 DHSS memorandum (not yet approved)…" to identify revised threshold values for fish tissue and additional pollutants for consideration. These values and additional pollutants, as of the drafting of this 2016 LMD, have apparently not been finalized by the DHSS for use in their Fish Advisories. It does not seem appropriate for the Department to utilize a draft memorandum that has not been finalized in revising fish tissue concentrations and adding pollutants for consideration in the 2016 LMD. Once these concentrations and additional pollutants have been finalized, the LMD should be revised accordingly, however, until the memorandum in question is finalized, revising the LMD does not seem appropriate.

Thanks again for the opportunity to comment.

Rob K. Morrison, PE

1

Senior Water Resources Engineer
Jefferson City office: 573.638.5025
rmorrison@barr.com
www.barr.com

resourceful. naturally. BARR

From: Rielly, Trish [mailto:trish.rielly@dnr.mo.gov]
Sent: Monday, April 28, 2014 7:45 AM
To: 'Catherine Wooster-Brown (Wooster-Brown.Catherine@epamail.epa.gov)'; Combes, Matt; 'CZell@Geosyntec.com'; DNRcontact, dcasaletto@ozarkwaterwatch.org; DNRcontact, smeyer@springfieldmo.gov; Mccauley, Jason; DNRContact, lholloway@mofb.com; McKee, Mike; Michaelson, Dave; DNRcontact, nbauer@stlmsd.com; DNRContact, pwalsack@mpua.org; DNRContact, rbrundage@ncrpc.com; Rob K. Morrison; Sarver, Randy; Wenzel, Jeff; Bataille, Karen; 'Trent Stober'; Milberg, Lynn; Hoke, John; Meredith, Colleen; Engeln, Joe; Voss, Robert; Lambrecht, Kirk; 'Stober, Trent'; 'Millington, Jan'; Errin Kemper; Whipps, Bill; Randy Crawford; David Carani (DCarani@Geosyntec.com); Hoke, John
Subject: FW: Revised 2016 LMD

If you already submitted comments, Thank You.

Just a friendly reminder. Your comments are due **Wednesday, April 30th**.

Trish Rielly, Water Quality Monitoring and Assessment Unit
1101 Riverside Drive, Jefferson City, Missouri
Phone: 573-526-5297
E.mail: trish.rielly@dnr.mo.gov
Water Protection Program URL: http://dnr.mo.gov/env/wpp/wp-index.html

Celebrating 40 years of taking care of Missouri's natural resources. To learn more about the Missouri Department of Natural Resources visit dnr.mo.gov.
The Department of Natural Resources envisions a Missouri where people live and work in harmony with our natural and cultural resources; make decisions that result in a quality environment and a place where we can prosper today and in the future.

From: Rielly, Trish
Sent: Monday, April 14, 2014 4:19 PM
To: 'Catherine Wooster-Brown (Wooster-Brown.Catherine@epamail.epa.gov)'; Combes, Matt; 'CZell@Geosyntec.com'; DNRcontact, dcasaletto@ozarkwaterwatch.org; DNRcontact, smeyer@springfieldmo.gov; Mccauley, Jason; DNRContact, lholloway@mofb.com; McKee, Mike; Michaelson, Dave; DNRcontact, nbauer@stlmsd.com; DNRContact, pwalsack@mpua.org; DNRContact, rbrundage@ncrpc.com; DNRContact, rmorrison@barr.com; Sarver, Randy; Wenzel, Jeff; Bataille, Karen; 'Trent Stober'; Milberg, Lynn; Hoke, John; Meredith, Colleen; Engeln, Joe; Voss, Robert; Lambrecht, Kirk; 'Stober, Trent'; 'Millington, Jan'; Errin Kemper; Whipps, Bill; Randy Crawford; David Carani (DCarani@Geosyntec.com)
Subject: Revised 2016 LMD

Bioassessment Workgroup Members,

Following the February 26th, 2014 workgroup meeting we've made additional revisions to the Proposed 2016 LMD to address major concerns/comments relating to biological assessment processes, and have completed a list of action items discussed during the meeting. We are still waiting on feedback from participants regarding specific wording suggestions or other information to consider – see attached meeting summary for specifics.

Attached:

2016 Listing Methodology Summary of Comments Following February 26, 2014 Workgroup Meeting

- *Revised 2016 LMD following Biological Assessement Workgroup meeting. In the proposed 2016 LMD, all updates and revisions are noted with a comment. Minor grammatical corrections are not noted in an effort to reduce document clutter.*
- *Biological Workgroup Meeting Summary 2-26-2014. All action items are highlighted in yellow. Additional comments were added to those items that have been completed and the location of the information.*

Please review the attached version of the Revised 2016 LMD and provide comments by ***Wednesday, April 30th 2014, at the latest****. Our plans are to present the draft 2016 LMD for the CWC approval at the July 9th, 2014 meeting. Therefore, we will need to have a final draft document completed and ready for the Commission Packet by early June.*

In closing, and as discussed during the February workgroup meeting, there are other aspects of the LMD we would like to address (e.g. formating and consolidation of tables). These efforts will take more time to complete. We are planning to have these updates completed during the 2018 cycle.

Thanks,

Trish Rielly, Water Quality Monitoring and Assessment Unit
1101 Riverside Drive, Jefferson City, Missouri
Phone: 573-526-5297
E.mail: trish.rielly@dnr.mo.gov
Water Protection Program URL: http://dnr.mo.gov/env/wpp/wp-index.html

Celebrating 40 years of taking care of Missouri's natural resources. To learn more about the Missouri Department of Natural Resources visit dnr.mo.gov.
The Department of Natural Resources envisions a Missouri where people live and work in harmony with our natural and cultural resources; make decisions that result in a quality environment and a place where we can prosper today and in the future.